

METHOD EMPLOYING UV LASER PULSES OF VARIED ENERGY
DENSITY TO FORM DEPTHWISE SELF-LIMITING
BLIND VIAS IN MULTILAYERED TARGETS

5 Abstract of the Disclosure

 The output of a continuously pumped, Q-switched, Nd:YAG laser (10) is frequency converted to provide ultraviolet light (62) for forming vias (72, 74) in targets (40) having metallic layers (64, 68) and a dielectric layer (66). The invention employs a first laser output of high power density to ablate the metallic layer and a second laser output of a lower power density to ablate the dielectric layer. The parameters of the output pulses (62) are selected to facilitate substantially clean, sequential drilling or via formation. These parameters typically include at least two of the following criteria: power density first above and then below the ablation threshold of the conductor, wavelength less than 400 nm, a temporal pulse width shorter than about 100 nanoseconds, and a repetition rate of greater than about one kilohertz. The ability to generate ultraviolet light output pulses at two power densities facilitates the formation of depthwise self-limiting blind vias in multilayer targets, such as a target composed of a layer dielectric material covered on either surface by a layer of metal.

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